



Solar Car Subwoofer

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TOOLS:

- [Car \(1\)](#)
- [Crimping tool \(1\)](#)
- [Drill \(1\)](#)
- [Handsaw \(1\)](#)
- [Wire cutters \(1\)](#)
aka side cutters



PARTS:

- [Solar panel \(1\)](#)
- [Charge controller \(1\)](#)
optional
- [Subwoofer amplifier and speaker \(1\)](#)
for car stereos
- [Lead-acid battery \(1\)](#)
- [Electrical Tape \(1\)](#)
- [Lumber \(2\)](#)
long enough to run the width of your roof rack. Actual dimensions: 1-1/2"x1-1/2"
- [U-bolts \(4\)](#)
to fit through roof rack
- [Nylon insert lock nut \(8\)](#)
matched to U-bolts
- [Flexible plastic tubing \(1\)](#)
enough for 4 short lengths to fit around U-bolts
- [Machine screw \(4\)](#)
- [Fuse \(1\)](#)
- [Insulated wire \(1\)](#)
- [Inverter \(1\)](#)
optional

SUMMARY

Toyota has been advertising the "solar roof" option for its Prius, which is basically a solar

panel that powers the cabin ventilation fan on hot and sunny days. But what they don't tell you is, you can have a solar roof on any car!

Last July I set up my own solar roof for a 2,300-mile road trip, and it worked like a charm, supplying me with laptop charge and ample stereo bass the whole way. (One of my prime objectives for the system was to power my subwoofer, because what's a road trip without awesome tuneage?)

The setup was simple. Power came from an 80-watt solar PV panel that I bolted to my station wagon's roof rack. I ran the power down through the rear hatchback to a charge controller and 2 lead-acid gel batteries behind the driver's seat.

With the resulting 12V DC power, I was able to run a subwoofer amplifier for the stereo and a small inverter to charge my laptop and other small appliances.

Step 1 — Choose a solar panel.



- Match the PV panel to the shape and size of your car's roof, and make sure that its expected daily output (peak watts x typical peak sun hours) will cover your expected daily load (total watts used x usage hours).
- Also make sure the panel is designed for 12V battery charging systems; these will typically have 36 cells and open circuit output between 18V-20V. Most panels will fit the bill, but avoid the newer type that works with super-high-voltage grids. And if a panel is priced more than \$5 per watt, you can probably find a better deal.

Step 2 — Choose a charge controller (optional).



- PV systems need a charge controller to keep the battery from getting overcharged. Some PV panels designed for small systems have charge control built in; this can be the easiest option, but it's often more expensive than using a separate charge controller.
- Some controllers, like the Morningstar SunSaver and Steca Solsum 6.6, have a low-voltage disconnect that prevents the battery from draining too low under small loads. Completely draining a lead-acid battery hurts its performance, so this is a nice feature.

Step 3 — Choose the battery.



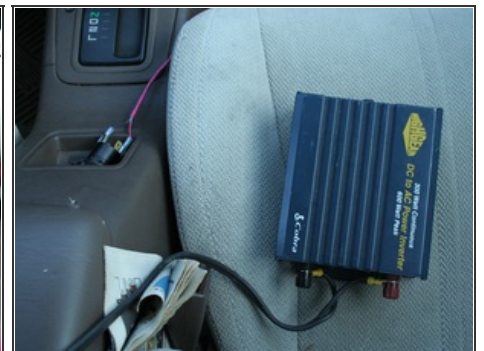
- Pick a battery size using a similar calculation to sizing the panel. Your expected amp-hour (Ah) usage during non-sunny times (watts hours /12 volts) should be less than 2/3 times the battery's amp-hour rating (to ensure no more than a 2/3 discharge).
- For more capacity, connect 2 batteries in parallel, which is what I did.

Step 4 — Mount the solar panel on the roof rack.



- My car's roof rack made mounting the PV panel easy. I attached lengths of 2x2 lumber perpendicular to the rack's rails using U-bolts and Nyloc nuts, slipping plastic tubing around the bolts to protect the rails. After more than 3,000 highway miles, I noticed no loosening or deformation of any part.
- My PV panel's frame consists of aluminum C-channel with holes in back for mounting. So I drilled holes through the 2x2s and used machine screws to attach the panel to the wood, securing them with nuts inside the aluminum channel.

Step 5 — Position the audio and power equipment.



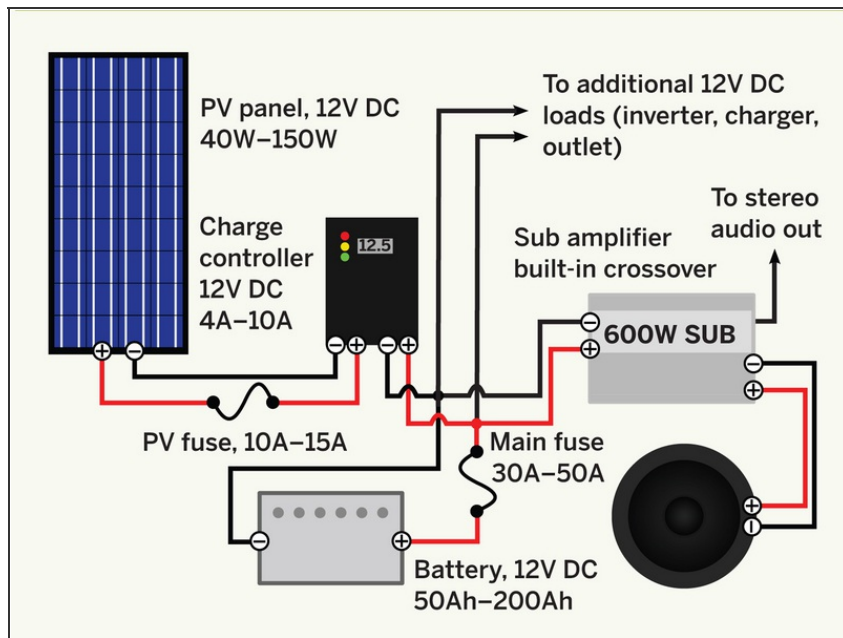
- I stashed the charge controller and batteries behind the driver's seat, and the subamp and speaker box under the passenger seat.
- I located the small inverter in the middle, on a cable long enough to let it reach the front seat and charge my laptop and other gadgets. All of the equipment stayed out of my way and didn't interfere with folding the rear seats down.

Step 6 — Run cables.



- To connect it all, I used landscape lighting cable because it's weatherproof, widely available, and inexpensive. For the interior, you could use any insulated wire 12-gauge or heavier.
- I ran the output cable from the PV cell through my car's rear hatch rain gasket and up to the charge controller, simply stringing it over the interior carpet and around the back seat.

Step 7 — Wire it up.



- Follow the wiring diagram to connect everything together.
- To protect your equipment, install fuses on the wires from the positive terminals of the battery and the PV panel. Locate the main fuse (30A-50A) on the battery, as close as possible to its positive terminal. A 30-amp fuse will support 350 watts of load.
- Insulate all connections well with electrical tape to protect them from short circuits caused by jostling in the car, especially the battery posts and the main fuse holder. Make sure that no wires are in a position to get frayed or yanked. If you use crimp terminals, crimp them tight; the wire should break before it comes out of the crimp.

Step 8 — Add an amp power switch (optional).



- For switching the amp on and off (to save battery power), I wired a switch in between the amp's +12V DC and Remote Turn-On terminals. The switch I used was a "Hazard" push button from a dashboard, which seemed appropriate.

You can add inverter outlets or cigarette lighter receptacles to a system like this; auto parts stores have many options for serving multiple circuits. I can see systems like this being worthwhile for avid car-campers. Many RVers put up solar panels; why should they have all the fun?

This project kept me supplied with charging power and sweet tunes for two weeks, all the way up and down the West Coast. It brought a smile to my face every time I turned it on. Happy solar sonic travels!

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